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AVIATION

The Oldest American Aeronautical Magazine



SPECIAL FEATURES

OPERATING METHODS AND POLICIES OF

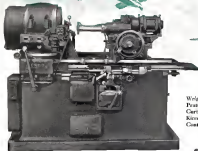
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Gliding swiftly down to a landing field that seems to rush up to meet you—a smooth glide while almost inch by inch the landing wheels reach for the runway—

They touch—and you hardly know the taxiing plane is on the solid earth. Again Grüss Aero Struts have helped to make a perfect landing.

The Grüss Aero Strut for landing gears provides a cushion of air for landing, combined with a hydraulic rebound check. When taxiing, a free and unrestricted movement of the air cushion takes up all shock and strain and permits quick take-off and shorter landings.



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A new standard of uniformity and interchangeability of parts. The Monocoupe is one of the very few planes sold with a guarantee that includes the plane and motor as a single unit.

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MOLINE, ILLINOIS



The Monocoupe is still the lowest priced approved plane in the world and will continue to give the greatest value for every dollar.

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For over nine hours daily on aviation exercises days a stock Spartan C-3 Walter was flown at full throttle to test its efficiency. At the end of 150 hours it had flown 13,500 miles without repairs of any nature to its machine. That flight surpassed earlier Spartan ideals of dependability and established conclusively that the Spartan C-3, Walter-powered, is the new standard of airplane value.

SPARTAN
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Heavier, more powerful than its racing mate, the Spartan C-3 Challenger is an expression of better aircraft. Beautifully streamlined, it is distinctly Spartan in both safety and performance and at the Detroit Show was instant and widespread approval. Powered with the Carlini-Challenger, 170-horsepower motor, the Spartan C-3 Challenger is the outstanding commercial airplane of the day.



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Watch this space for our future advertisements that will describe additional features of the NEW SERIES SIEMENS—availability . . . price range . . . service . . .



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PERFORMANCE DATA on the Davis V-3 Monoplane, as one reader remarked, is "tantalizing, if true" . . . We're glad to reply that it is true—but even then it tells only part of the story.

Here's a two-place plane you can cruise at 240 mph—with a fuel consumption of only 4½ gallons per hour. Full throttle, and you're doing better than ninety-five.

You'll find stability you've never before experienced in a plane of its size—stability you have previously expected only in larger and heavier planes.

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Seriously, rugged, the Davis V-3 is ideal for student training and the private owner . . . You can never fully appreciate it until you've flown it—but you will be amazed at the complete story of the V-3. Write for it.

Many rich owners are still shy. Responsible dealer on hand to write for complete details of the Davis V-3.

DAVIS AIRCRAFT CORPORATION
Bloomington, Indiana

\$2965

Planes at field
Complete
with 120-hp. 40 H.P.
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PERFORMANCE (Actual)

Service Ceiling	10,000 feet
High Speed	91 M. P. H.
Cruising Speed	81 M. P. H.
Coasting Speed	31 M. P. H.
Climb	30 M. P. H.
Cost Consumption at Cruising Speed	700 ft. per gallon
Cruising Range	400 gallons per hour 300-400 miles

DAVIS V-3 MONOPLANE

A TWO-PLACE HIGH-WING MONOPLANE—THE AMERICAN MOTH

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Lighter than Aluminum

78%

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A new means of decreasing aircraft weight! Use Bohnalite X for many of the engine parts as well as innumerable other hardware items of the ship.

This new light alloy—36% lighter than aluminum and 78% lighter than iron—is being used for castings, forgings and extrusions.

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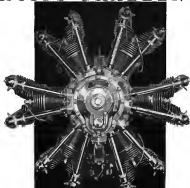
Send us your blue prints. Let our aircraft engineering department show you new ways and means of weight reduction. Write today for complete information.

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Ex-Cell-O is equipped for the complete production of parts of more than usual accuracy—from raw material to finished product. Ex-Cell-O parts are made exclusively to manufacturer's specifications.

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Piston Pins • Wrist Pins • Link Pins • Cam Rollers • Cam Followers • Tappet Guides • Valve Guides • Spacers • Thrust Washers • Thrust Pins • Valve Seats • Millard Thread Studs •

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TRAVEL AIR ADOPTS AEROL STRUT THREE-POINT SUSPENSION

Among the new and interesting features that have been incorporated into the new Travel Air Cabin Monoplane is Aerol Strut Three-Point Suspension. This step insures a higher degree of landing, safety, taking smoothness and take-off ability than ever achieved before.

The above view of a Travel Air Monoplane shows the tail wheel unit installation and the completeness of Aerol Strut Three-Point Suspension. The rear wheel unit functions the same as the two main strut units. It was developed in response to a demand on the part of manufacturers and pilots for a unit that would

complete the job of ship protection; the job that Aerol Struts had so ably begun.



The new three-point Aerol Strut suspension system, designed by the Travel Air Company, is the latest development in the art of landing system construction. It is a unit that insures the most complete protection of the fuselage and engine.

Other five-pointed manufacturers are now working with our engineers in incorporating the tail units into their design. We confidently believe that Aerol Strut Three-Point Suspension will enjoy the same acceptance that has been accorded Aerol Struts, which are now standard equipment on twenty-two makes of ships and optional on practically all others.

Aerol Struts are manufactured by the Cleveland Pneumatic Tool Company, Cleveland, Ohio.

ASK THE PILOTS WHO LAND ON THEM

AEROL shock absorbing STRUT

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THE successful carrying out of airport and aviation projects for A. D. C. clients, among whom are—

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Pittenger Aircraft Corp. of America
New Cumberland Airport
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denotes the value of co-ordinating the efforts of pilot, engineer and planner with practical business experience—with one profit—in one organization,

**Airport Development &
Construction Co.**

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that reflect Accuracy in
its highest **POWER**



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degrees of accuracy with which each part is manufactured.

Aerflex Airflex Engines are the product of 37 years' experience, focused in one organization, engaged in the art of fine tool making and precision mechanical manufacture.

During these 37 years Aronson has produced many millions of dollars worth of free tools and mechanical products, such as heavy-duty pressure locks, gages, fluid control and well pumps, and other works requiring a knowledge of the most advanced methods of metal analysis, heat-treating processes, precision measurements and testing.

It was but a logical step for Aristotle to deduce that rapid reproduction and access to the development of surplus engines that would dominate in quality and therefore equally as much to do. Aristotle's logic and all his arguments in their respective fields.

As a result of years of research and study, supported by the broad and successful experience of the organization, a psychiatric clinic, school, and social system is evident. It is unquestionably the outstanding achievement in mental health, complete in construction, developing the highest competence of any degree of mental care, and embodying every technical discovery, particularly in the method of education.

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400 R.P.M. LOAD SPEED

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Only...\$78

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TRADE YOU for winning AVIATION

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AMPHIBION



The UNPRECEDENTED DEMAND FOR THE SIKORSKY AMPHIBION forces us to announce regretfully our inability to fill new orders for four months discriminating purchasers say, however, that the Sikorsky is worth waiting for.

CURTISS FLYING SERVICE

"WORLD'S OLDEST FLYING ORGANIZATION"

Sole Sales Agents for SIKORSKY AVIATION CORPORATION

EXPORT AVIATION IMPORTS INC. CO.
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CURTIS AERONAUTICS AND MOTOR CO., INCORPORATED
BRAND AERONAUTICS, INC.

CORPORA-TION INC.

27 West 57th Street, New York City

TRADE YOU for winning AVIATION

Travel Air Questionnaires Still Pour in Owner Satisfaction Everywhere—

QUESTIONNAIRE

1. When did you purchase your Travel Air Plane?
August 18, 1958

2. What is the Serial Number on your plane?
Model 1000

3. Have you always been satisfied with it?
I like it better every time I fly up in it

4. If so, will you please name the features that appeal to you most forcibly in this plane?
The sturdy part of it and the wonderful performance in any kind of weather. It has a wonderful take-off and climb.

5. If not, what have been your difficulties?

My only trouble has been with the oil and consumable.

6. Have you any suggestions to offer?

My only suggestions are that you continue to make more Travel Air planes. I have flown hundreds of planes but I just come at home and want only in my Travel Air plane.

7. Have you always received satisfactory service and attention on parts?

I certainly wish to congratulate you as your Albany shop. We don't like to fly here always down for the boys who have purchased Travel Air planes from him. (Good luck, Bob.)

8. Be general how are you satisfied with Travel Air Products, and would you buy another Travel Air if we had a model that would suit your requirements?

When my plane has done for me, she will be replaced with another Travel Air

9. May we quote you in our advertisement?

Yes
Charles George,
Quincy, N. Y.

QUESTIONNAIRE

1. When did you purchase your Travel Air Plane?
August, 1958

2. What is the Serial Number on your plane?
Serial No. 431

3. Have you always been satisfied with it?

Yes.

4. If so, will you please name the features that appeal to you most forcibly in this plane?
Sturdy and quick to fly-off.

5. If not, what have been your difficulties?

None.

6. Have you any suggestions to offer?

No.

7. Have you always received satisfactory service and attention on parts?

Yes. (Have returned no parts except parts in parts.)

8. Be general how are you satisfied with Travel Air Products, and would you buy another Travel Air if we had a model that would suit your requirements?

Yes.

9. May we quote you in our advertisement?

Yes. We have had absolutely no trouble in 100 hours. Our field is 2000 feet above sea level and the plane takes a few hours to fly and land extremely well with tail wind.

James D. Lambart
Serp., McCloud Area Club

When Travel Air recently sent a questionnaire to customers, over 1000 the right answered to point in thousands of equally positive replies, similar to the above are not able to more often. We will reproduce others in this magazine next week.

Free on Request "The Story of Travel Air" New Edition

"The Standard of Aircraft Comparison"

TRAVEL AIR COMPANY

WICHITA, KANSAS

Now... a Bird a day



All this
performance

with a Curtiss OX-5 Motor

High Speed	120 M. P. H.
Landing Speed	10 M. P. H.
Cruising Speed	100 M. P. H.
Gas Consumption at 100 M. P. H.	3 gal. per hr.
Take Off Run	500 feet
Rate of Climb	1,000 F. P. M.
Absolute Ceiling	20,000 Feet
Endurance at Cruising Speed	9 Hours

Powered with Curtiss OX-5 Motor
and equipped with Propeller

for \$3295

Buy your Bird from the



GREATEST PERFORMANCE PER HORSEPOWER... has established the BIRD as particularly suitable for commuting and cross country trips of the average pilot... for the passenger hopping and taxi service of the commercial pilot... for the aviation school... and for the newly licensed flyer. "Bunch-of" stability, 10-to-1 gliding ratio, low landing speed, contribute to dependable, safe performance and marked operating economy. All these refinements of design, combined with the low cost resulting from advanced plane-of-day production methods, have established BIRD leadership in the popular price class.

Dealer franchises for the plane in various territories are still available

Brenner-Winkle Aircraft Corp. / Hempstead, L.I., Greenvale, N.Y.
DEPARTMENT OF COMMERCE APPROVAL 125



Coast-to-Coast
Demonstration Tour

A regular three plane BIRD sales tour fully production has begun a month to coast demonstration tour. We will be glad to supply information regarding its route, any by mail, telephone or telephone.

B I R D - L I K E



MANEUVERABILITY

Watch the graceful gull—from high aloft swoop suddenly down—poise an instant over the water—snatch its fanny prey—and soar away into the blue . . . all with effortless ease. There you have an interesting parallel to the inherent maneuverability of THE FLEET. Only a rugged plane with bird-like flying qualities could equal its instant responsiveness to the controls . . . that singularly satisfying "feel" of a perfectly balanced piece

of mechanism. Built to a standard—no to a price—The Fleet is amazingly easy to fly. Its take-off is short and smooth, and in landing it glides gently to earth like a homing pigeon returning to its loft. In selecting the ideal plane

for your private use—or the perfect plane for training purposes—read the fascinating story of THE FLEET. A copy will be sent on request, Fleet Aircraft Incorporated, 2050 Elmwood Avenue, Buffalo, N. Y.



FLEET AIRCRAFT

THANK YOU for reading AVIATION

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

June 22, 1929

Volume 11 Number 12



A DECLARATION OF

Publishing Policy

THE INTEREST of the McGraw-Hill Publishing Company in aeronautical matters, long apparent to the readers of many of our publications, centered upon a new phase with the recent purchase of AVIATION. With the acquisition of this magazine we become a part of the aeronautical industry, with a direct share in its interests and a responsibility to make our contribution to its welfare. We now pause in the early stages of this undertaking to survey our place in the industry and declare our policy.

FOR THE BENEFIT of the recent growth of the airplane industry, and especially for the sudden increase of popular interest in its work and acceptance of its products, history hardly offers a precedent. No individual can hope to keep his eye upon the manifold facets of the industry's spreading activities. Under these conditions of constant change the function of the trade and technical press are of particular importance. To sort out the historic events among the ephemeral to segregate the important news from the trivial, to interpret its significance, to make periodic report upon the state of development and the progress of the arts and sciences entering into the industry, and to present all that in convenient form for the busy reader is to perform a public service of no small magnitude. To its performance our best efforts and resources shall be devoted.

BUT that is not the end of our responsibility. We recognize a dual function—to inform and to counsel. A horde of alternative undertakings are clamorous for the industry's attention and support. Not all aeronautical activities are wisely planned. There is a lavish pouring out of effort which, from the very manner of its expenditure, has but little chance of proving fruitful. In holding the scale upon the one of costs, in forecasting the future or in drawing lessons from the past, we seek to

represent the industry's soundest and best judged opinion. We hold before ourselves the ideal of an equal readiness to criticize wherever criticism is needed, or to praise wherever praise is justified. An editorial page affords no shelter for baseless platitudes.

THE STATE of the aircraft industry and of commercial aircraft operation for trade and technical publications may grow varied and complex beyond the possibility of present thought. To keep abreast of the demands and to meet them as they arise will be our objective. It becomes a part of our fixed policy backed by all our resources. The adding to our group of publications of the oldest and best known American aeronautical paper was the initial step in its realization.

THE INDICATION of an aviation magazine to our group does not imply any diminution of the interest already displayed in aeronautical matters by other McGraw-Hill publications. The aeronautical industry should be harmonious and coherent, but it cannot be isolated. It meets with many other industries and professions at many points of contact, and it needs the help of many specialists. To them, in return, it brings the services of an indispensable new vehicle of high-speed transport, an instrument of which every business enterprise will have occasion to make use. Through the possession of twenty-six magazines covering a wide range of industry, we have an exceptional opportunity to stimulate mutual understanding for mutual profit, keeping our readers informed as the development of the airplane and activity as new tools of business, on what aircraft can do for them and what the aircraft industry needs that they in turn can supply. It will be an essential feature of our future policy to use that opportunity to the full.

Edward P. Warner

EDITOR OF "AVIATION"



EDWARD P. WARNER

RECOGNIZING the obligation implied in the dedication of policy on the first text page, we announce that on July 1, Edward P. Warner, recently named as Assistant Secretary of the Navy for Aeronautics and professor of aeronautical engineering at Massachusetts Institute of Technology, will become editor of *AVIATION*. In addition to serving in this capacity he will also have a broader relationship to McGraw-Hill as a consultant on aeronautical matters more specifically within the editorial fields of other publications of this house. In this respect it is expected that not only will *AVIATION* enhance its present prestige and extend its influence as the oldest and best known American aeronautical magazine, but that McGraw-Hill service as a whole to the industry will be more fully developed and correlated.

MR. WARNER has had a distinguished career in the aeronautical industry, covering over a long period of time and embracing a variety of activities and relationships. His interest as a student of aviation dates from 1920 when he constructed a glider that subsequently took a prize in the first international and intercollegiate glider meet ever held, at the Squantum Aviation Field near Boston, in the Spring of 1921. His active participation in the industry began about the time of the entry of the United States in the World War, and from that time to the present he has been active as an author, teacher and public servant in the field of aeronautics.

AS AN AUTHOR Mr. Warner has made important contributions to aeronautical literature. Among these are three reports of the National Advisory Committee for Aeronautics relating to original research, respectively, in the structural longitudinal stability of airplanes, the measurement of angles of attack and air speed measurements, with special reference to the causes and prevention of spinning; and in the field solution of problems of airplane wing stress strain analysis by the use of displacing charts and techniques.

OUT OF HIS EXPERIENCE as a teacher have come two volumes, one on "Aerodynamics" and the other on "Aerodynamics of Airplane Design." The latter was honored by the award of the medal of the Aero

Club of France for the best technical aeronautical work published in 1927 in any language. Current literature also has accorded Mr. Warner's contributions. He assisted in the preparation of the early numbers of *AVIATION* and has been an intermittent contributor to the magazine throughout its life. Through the Society of Automotive Engineers he procured a study of the development of simplified formulas for airplane performance prediction, and another commission on the design of commercial airplanes.

IN ACCORDANCE to his work in the Navy Department and Massachusetts Institute of Technology Mr. Warner has served as chief physicist for the National Advisory Committee for Aeronautics, and was technical attaché for that body in Europe in 1930. In Massachusetts he served as chairman of the Massachusetts State Board of Aeronautics, and of the Boston Municipal Air Board. Mr. Warner has also been active in engineering societies. For one year he was second vice-president of the Society of Aeronautical Engineers for Aeronautical Engineering and is now first vice-president of that society. He was also chairman for one year of the aeronautical division of the American Society of Mechanical Engineers.

WITH THIS RICH BACKGROUND of training and experience, reflecting not only a broad knowledge of aeronautical matters but also a comprehension of the problems of the aircraft industry, Mr. Warner assumes the editorship of *AVIATION*. Under his leadership the publishers are confident that the magazine will not only continue the excellent service it has rendered thus far, but will go forward to greater achievements in the interest of the aircraft industry.

EARL D. MCGRAW, former publisher and present editor of *AVIATION* will continue his relationship with the magazine after July 1 as contributing editor. During his travels in Europe this summer he will represent the magazine and will report his observations on European progress and activities in the field of aeronautics.

James H. McGraw
CHAIRMAN OF THE BOARD

OPERATING METHODS AND OF *Curtiss Flying*

POLICIES Service

By JAMES P. WINES



Walter D. Bowers, President of Curtiss Flying Service, Inc., is shown in the foreground of the Curtiss Flying Service, Inc., headquarters at Garden City, N. Y.

FORMATION of Curtiss Flying Service, Inc., with headquarters at 25-27 West 50th St., New York, N. Y., is perhaps one of the most interesting developments from a merchandising standpoint that has taken place in the aeronautical industry.

The Curtiss organization is nothing more or less than a nation-wide distributing agency, both wholesale and retail, for aircraft engines, supplies and accessories, and half a dozen lines of planes. In itself, the organization of a concern to handle this number of aeronautical products throughout the nation would be worthy of comment but the methods adopted by the flying service for sales promotion are even more noteworthy.

The activities of the Curtiss service have been based under four main headings. These are, sales, service, training and operations. Each of the four activities is separately and is conducted by a different division of the company. Undoubtedly, each will show a profit, but even though the sales department were the only one of the four to show a profitable return, the operation of the others might be worth while. The primary reason for the existence of Curtiss Flying Service is to sell

planes through its own sales and through dealers in every part of the country. In this work, the service, the operations and the training divisions of the company will be of the utmost importance.

In the past, service for aircraft has not been of great importance. The lack of it has been extremely annoying at times, but it has not been particularly detrimental to sales, because no manufacturer supplied it. Moreover, sales for the most part were made to professional pilots and operators, who were either in a position to do the work themselves or to maintain their own service stations. Now, however, an attempt is being made to enlarge the market. Efforts are being exerted to sell planes to private individuals to business houses, to surgeons who can possibly make use of the airplane advantageously for pleasure or business.

In attempting to sell these markets, the salesman will be constantly met with the question, "Well, where can I obtain service?" The average automobile owner, even though he may be quite capable of doing the mechanical work, does not want to bother with it. He is more than willing to pay for service if he knows it will be satisfactory. In fact, when a purchaser is called upon to make a selection between two automobiles, he usually chooses the one on which he can

obtain the best service. With the airplane, the provision of good servicing facilities is even more important, and service for engines and planes unquestionably will have more direct bearing in the future on aircraft sales than any other single factor. Officials of Curtiss Flying Service realized this in drawing up the plans for its service department.

The company will be opening branches in 34 cities before the close of the year. These are Atlantic City, N. J.; Baltimore, Md.; Boston, Mass.; Bridgeport, Conn.; Buffalo, N. Y.; Chicago, Ill.; Cleveland and Columbus, O.; Denver, Colo.; Detroit, Mich.; Hartford, Conn.; Houston, Texas; Indianapolis, Ind.; Jacksonville, Fla.; Kansas City, Mo.; Los Angeles, Calif.; Louisville, Ky.; Manchester, N. H.; Memphis, Tenn.; Miami, Ill.; Nashville, Tenn.; New York, N. Y.; Philadelphia, Pa.; Portland, Me.; Providence, R. I.; Raleigh, N. C.; St. Louis, Mo.; San Francisco, Calif.; Springfield, Mass.; Syracuse, N. Y.; Toledo, O.; and Worcester, Mass.

At some of these places, the Curtiss organization is taking over smaller operations, at others, it is starting from the bottom, building its own groups in their entirety. In some cases, it is operating from unimproved or privately owned fields, while in others it is constructing its own airports. But at each base, there will be a trained staff of mechanics and a completely equipped wood working and machine shop for servicing.

Even Curtiss service stations will also maintain a complete stock of aircraft supplies, spare parts and accessories. These will be principally for the lines of planes and engines handled by the Flying Service, but spares for other makes will also be kept on hand, since all types of engines and planes are to be serviced. In the territories where there is the greatest amount of flying service, the stations will naturally be larger and where there is less, they will be smaller. However, there will be no lack of equipment or supplies in any of them. The cost of the original



Flight plan of one of the Curtiss Flying Service, Inc., aircraft. The Curtiss Flying Service, Inc., is shown in the foreground of the Curtiss Flying Service, Inc., headquarters at Garden City, N. Y.

stock and equipment going into the smaller or Class "B" units is \$6,000 while \$20,000 is being expended on each of the Class "A" type.

Without taking into consideration the actual spare parts that are to be stocked, the holdings in the catalog issued by the servicing department serve as an illustration of the large amount of materials that will be available. These holdings include aluminum sheet, aluminum powder, anti-block rollers, brackets, batteries, books, wire mesh cable, nylon cable, telescopic cable, cones, tape, enamel, engine stands, fuses, fuel and lines, summer and winter flying suits, launch, flashlights, fire extinguishers, waterproof glass goggles, gas masks, goggles, gloves, goggles, material, trousers and winter boots, construction



The factory of Curtiss Aircraft & Motor Company, Inc., at Garden City, N. Y.



A large view of the Curtiss Flying Service, Inc., at Garden City, N. Y.

bolts, head clamps, backstop blades, ball pen barometers, Hachette, gasoline hose, water hose, metal asbestos exhaust hose, hose clamps, Pioneer instruments, Duffin instruments and Continental instruments.

Other materials listed are, knives, file hooks, lemons, lights, maps, magazines, meters, thermoses, needles, crochets, oil, oil cans, pulleys, Pyralis, Postone, Postonolite, paint and varnish remover, pellets, pump jacks, pencils, protractors, paper, powder, parachute flares, propellers, propeller puller kits, glass, rule, chalk card, oiling paste, soap, shifter, signals, spark plugs, screwdrivers, sheet steel, thread, tape, tacking, turnbuckle, treated propellers, force, valve, tie, wrench, washers, tire repair kit, COX-2 tool kit, uniform, valve grinding compound COX-5 valves, wheels, wheel struts, wheel bushings, wrenches, wheel breakers and wheel cones.

There will be a retail store at each wing where these supplies and the others handled by the Curtiss service stations will be developed in store cases and show windows, just as automobile supplies are exhibited in a retail automobile tire supply house. The business done by the Curtiss Flying Service at the Garden City, L. I., N. Y., field, John G. Smolenski, general service manager, predicts that a tremendous volume of "over the counter" sales will result. A retail order business is also to be worked up with the plane owners in the territories of the various stations. This retail supply service is to be maintained for the class of plane owners who want to perform their own maintenance work. In addition to supplying the customers, though, the store will act as a stockroom for the engine and plane repair shops. It will also supply the Garden City.

THE INSTRUCTORS employed at the various Curtiss Flying Service units will be schooled at the Buffalo, N. Y., plant of Curtiss Aeroplane & Motor Company, Inc., before being sent into the field. The training given at the factory has no duplicate here. Some of the students may remain there only two weeks, while others will be kept there a full year. The flying service is interested only in their proficiency and in manufacturing them with the maintenance of Curtiss products, not in the length of time that the schooling takes. During the training period, of course, the students are paid but a nominal wage. There are now 12 of them at the Curtiss plant. Some of these men hold Department of Commerce licenses and others do not. However, all that are admitted to the course must show that they have had sufficient experience to obtain both airplane and engine mechanic's licenses.

Rates for service will be standard at all Curtiss Flying Service units throughout the country. For mechanic work, the customer must pay \$2 an hour in addition to the cost of the materials consumed, and \$3 an hour for welding, provided only one man is assigned to the job. If the work is such that it requires the services of a mechanic's helper, the customer must pay 75¢ an hour for the helper's time. These rates apply to all planes. The hourly charges, according to M. C. Smolenski, were decided upon for repair and overhaul work rather than the fixing of flat tires for specific jobs, because it was believed better work could be performed on an hourly



An EE powered Curtiss "Katie" in a schooling lane.

basis. He pointed out that a mechanic could be employed only for a limited time on a job if it were accepted at a flat rate, and that some work might be slighted by this system.

For washing, washing and polishing, and storage, the various types of aircraft are divided into three classes. Group No. 1 includes Warps, Travel Airs, Swallows, Curtiss "Robbers" and smaller planes. The second class takes in Stinson, Travel Air and Lockheed monoplanes and others of approximately the same size, while the third group includes air-engineered planes and other large types, such as Schenck amphibians. Washing aircraft of type No. 1 will cost \$6, type No. 2, \$10, and type No. 3, \$20. Daily washing and polishing planes in the first group will cost \$10, while the charge for this service on planes in the second classification is \$15. There is no flat rate for washing and polishing planes of the last group.

The area for storage, which includes the labor of moving the planes in and out of the hangars and servicing with gasoline, oil and water on request, are as follows:

Plane Type	Overnight	Weekly	Monthly
No. 1	\$3	\$13	\$40
No. 2	\$3	\$18	\$54
No. 3	\$8	\$45	\$135

Aside from its subsidiaries as an aid in promoting aircraft sales, and this cannot be minimized, the servicing department of Curtiss Flying Service, Inc., without question will be one of the most profitable divisions of the company. The supplies sold at retail will bring a return of from 30 to 35 per cent, and, even though these sold to dealers at wholesale prices will bring a slightly smaller return, the company will realize an excellent profit on them. Sales of fuel and oil and rentals will provide an added source of income. There will also be a profit on labor, since the mechanics employed are to be paid straight salaries, which will probably range from \$40 to \$75 per week. The servicing department will be responsible for the maintenance and upkeep of the planes used by the training and operations divisions, but there will be no profit in this work, since it is to be done at cost.

The training division is perhaps next in importance to servicing in the promotion of sales. It has been estimated that more planes will be produced this year than there are pilots to fly them. That being the case, it stands to reason that more than most be trained of sales of aircraft are to increase tremendously. There is another point in connection with flying schools and sales, though, which offers a reason for the extension of schools at each Curtiss Flying Service base, and it is why the organization is advocating that its dealers make training one of their activities. This is the fact that as a dealer always has a flying field on the premises in which he was trained, and with that being he is more than a good prospect for the purchase of one of these planes.

GROUND SCHOOL instruction in each of the cities, where the Curtiss organization is to establish a base, is to be given in the down-town section in order to make attendance as easy as possible for the students. The ground school course will be taken separately, but an student will be admitted to the flight school without first having taken the ground instruction. For training with a view of obtaining a private pilot's license, 50 or 60 of ground school study will be required, while 100 or 120 by the flying service for all those wanting to be limited commercial pilot's license. To cover the course for a transport pilot's license, even more ground instruction is given.

The flight instruction, like the ground school courses will be standard at every unit operated by Curtiss Flying Service. The same syllabus of training is to be used by each unit, in addition, all the instructors are got through a school at Detroit before being sent out to the various bases. This is to insure a uniform method of instruction. The average number of hours in the air which the students have, is 1,500.

The 20 hr. private pilot's and the 50 hr. limited commercial pilot's courses are to be given at all the Curtiss units. If a student wishes to take the 200 hr. transport pilot's course, however, he will be sent to one of several transport schools after finishing the 50 hr. course at the local unit. So far only three bases have been chosen for conducting the longer course. These are the ones at Detroit, Chicago and Los Angeles, although more will be designated later. A 30 hr. seaplane course is also to be offered at some of the airports to be established by

the service. One of these is at Port Washington, L. I., N. Y. The others probably will be at Detroit, Chicago and on the West Coast. Department of Commerce ratings will be sought for all the Curtiss schools.

Curtiss Flying Service is the distributor in the United States and Canada for Ireland "Amphibians," Sikorsky amphibians, Curtiss "Robbers," Cessna monoplanes, and Command-Aire biplanes, as well as the complete line of planes and engines manufactured by Curtiss Aeroplane & Motor Company, Inc., and it is in these planes that the students will receive their flight instruction. Curtiss

"Fledglings," powered with "Challenger" engines, have been adopted as the standard open training planes. To give the students experience in closed cabin planes, Cessna and Stinson will be used. These in all probability will be the only types in which instruction is given the 20 hr. students. Additional types will be added for those taking the limited commercial pilot's course, and the transport students will be trained in all the planes handled by the service. In addition they will be given experience as second pilots on some of the short haul



Above: An Ireland "Amphibian," manufactured by Ireland Aircraft, Inc., for which Curtiss Flying Service, Inc., is the sales agent. Below: The command operated by the Curtiss Service at Palm Beach, Fla. Note the holes in the sand in the runway.



passenger lines to be operated by the company. The inflated boats will be used to train the surplus student pilots.

The prices for the flying contract, like all the others charged by the Curtiss service, are standard. They are as follows:

Private	\$ 600
Limited Commercial	1,500
Transport	4,500
Synplane	1,000

From the standpoint of sales promotion, the activities of the operations division, which include the operation of a taxi service from every base, crop dusting, aerial photography, and the establishment of short haul air transport lines at strategic points, may seem a little far-fetched, but they are no more so than many of the promotional activities adopted in other industries. Curtiss Flying Service is interested in familiarizing the public with the planes it is handling. It wants the public to become used to flying in them, and it wants the public to become used to flying in them, and it wants the public to become used to flying in them. The only reason by which this can be done practically is through a system such as the one adopted by the service.

The equipment used by the operations division in its taxi service will vary at each base according to the amount of traffic. At Valley Stream, L. I., the new New York base, probably one or more planes of every type

loaded to capacity, is in service. The piston plane is rate based on the operating cost of the plane per mile, not on the number of seats. As a result, he may carry as many friends, or as much luggage as he chooses up to the capacity of the plane, without additional charge. The tariffs are computed on a round trip basis also. If someone wants to fly from New York to Boston, he will pay for the operation of the plane both ways, even though it may return empty. If he wants to leave the plane in over, of course, so that it may bring him back, he is charged for the layover. Another interesting point is that the piston must pay for the mileage of a pilot from the nearest base, if he happens to be at a point where there is no Curtiss unit. In other words, a man in Grand Rapids, Mich., who charts a plane for a trip to New York, will pay for the distance from Detroit, the nearest base, to Grand Rapids, from there to New York and from New York back to Detroit again. Distances, by the way, are computed from airport to airport and not from city to city.

THE RATE varies with the types of planes and also with the type of flying that is to be done. For example, the rate charged for a Sikorsky S-38 for ordinary cross-country flying is \$1.00 per mile. For over water flying, which is defined as a route over water 50 mi. or more, the rate is \$2.00 per mile, while night flying over a lighted survey is charged for at a rate of \$2 per mile. Charges for all other light flying are double the ordinary day rate. In case the actual mileage of a route cannot be estimated, hourly rates, based on the cruising speed of the plane, are charged. Rates for an OX (seater), Sikorsky, the lowest of any plane operated by the Curtiss service, are 40¢ per mile for cross-country flying and 80¢ for night flying. The Robins are not available for over water service. Later, when the traffic between any two cities amounts to, the rates may be reduced so that the passenger pays for the plane only one way. Before this occurs, however, the pilot will have to be lucky enough to practically assure a load on the return trip.

The first airline to be established by Curtiss Flying Service is the one now operating from New York to Atlantic City, N. J. Sikorsky amphibians are used on this line. Another line will be operated during the winter along the Florida coast, while others will extend from New York to New England. Another line is the transcontinental route may also be expected to be established. One plane, probably of the Robins or the Grumman class, will be based at each end for use in the aerial photographic service to be operated by the Curtiss organization, which will include both mapping and oblique photography. The flying service pilots are being trained for this work, and a photographic laboratory for developing and printing pictures has been established in New York. Crop dusting patterns will be done for the most part in the South, although it is expected some will be performed in the North.

It is reasonable to suggest that a person making use of the Curtiss charter service to any great extent will be the advantage of viewing a plane of his own, and in all probability will be an exceptionally good prospect. While this may not be true of those taking advantage of the crop dusting and photographic services, these activities are valuable in the promotion of sales. In fact, any activity that gives publicity to a firm and its products is valuable. In the current operations and the existing divisions, Curtiss Flying Service has three activities that will do much in aiding sales.

THE GROWING Export MARKET

Aircraft Exports for First Quarter of 1929 Double in Value Those for 1928 Period

By COURTS D. REA

Aeronautics Section, U. S. Bureau of Foreign and Domestic Commerce

IT APPEARS from recently available export figures that the American aeronautic industry has witnessed to the possibilities existing for sales in foreign countries; also to the benefits accruing from distributing their products.

Shipments to foreign markets in the past have been primarily due to the efforts of a small group of American companies who have played the part of promoters in stimulating interest abroad in our production. These companies, of course, had their production up to the point where they were able to handle domestic sales and have a surplus for export. Now, even some of the smaller aircraft companies are establishing export departments and are beginning serious foreign trade.

The value of exports of airplanes, synplanes and amphibians during the first quarter of the current year was

United States Exports of Airplanes, Synplanes and Amphibians

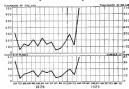


Fig. 1

\$1,101,520 which is over twice the valuation of these shipments for the same period of 1928. The total exports did not increase in similar ratio, there being 69 aircraft shipped abroad during the 1929 quarter as compared with 49 in January, February and March of 1928. This indicates that a larger number of manufacturers are getting into the export field, as the average unit value has increased since early last year, when the bulk of foreign sales consisted of expensive military types.

Exports of airplanes for March of this year amounted to 38 planes valued at \$1,046,555. This figure represents the peak as to volume of exports over any previous month since American manufacturers participated in the exporting of airplanes. The accompanying graph (Fig. 1) traces the foreign shipments over a 15 year period. It will be seen that the line plotted for sales in dollars follows closely the trend of that showing units exported.

Six countries were responsible for the unprecedented increase during March of 1929. Mexico purchased 18 planes valued at \$388,418, Chile 8 units at \$115,320. The other countries procuring with notable orders were Japan, Canada, Cuba and French Congo.

One reason for the increase could be attributed to initiative on the part of the industry. Mexico, which purchased more airplanes than any other country early this year, had a reason for buying them, independent of any effective sales effort. That country, however, is becoming increasingly assimilated. Flying clubs are being formed all over Mexico and have been common users of aircraft, and should continue to purchase them. Several organizations exist for airlines in Mexico which even if operated by Americans will assure sales of aircraft for use in a foreign country.

Chile was the second leading market for aircraft during the first quarter. The figure shows that for country purchases both military and commercial types, the latter for operation on air routes by the Chilean Government.



A view of the Curtiss Flying Service station at the Curtiss Aircraft Base in Detroit, Mich.

handled by the service will be used. In addition, the Valley Stream unit will operate the two biengines Ford amphibians it now has. The minimum amount of equipment maintained at any base will not be less than two Robins or two Grumman amphibians. If there is a demand for a larger type of plane at one of the units where only the small ones planes are based, it will be a simple enough matter to dispatch one to that point from another unit. Lack of equipment can also be taken care of by transferring some of the existing planes into service, although it is not anticipated that this will be necessary.

The taxi service is in reality a charter service. Whether a trip is made with but one passenger, or with the plane

United States Exports of Airplanes and Synplanes

Country of Destination	First Quarter 1929 Value	First Quarter 1928 Value
Mexico	\$ 897,712	\$ 147,172
Canada	388,418	115,320
Japan	115,320	41,400
France	41,400	41,400
China	41,400	41,400
Spain	41,400	41,400
Italy	41,400	41,400
Germany	41,400	41,400
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Sweden	41,400	41,400
Denmark	41,400	41,400
Belgium	41,400	41,400
Switzerland	41,400	41,400
Portugal	41,400	41,400
Spain	41,400	41,400
France	41,400	41,400
Italy	41,400	41,400
Germany	41,400	41,400
Sweden	41,400	41,400
Denmark	41,400	41,400
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Switzerland	41,400	41,400
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Italy	41,400	41,400
Germany	41,400	41,400
Sweden	41,400	41,400
Denmark	41,400	41,400
Belgium	41,400	41,400
Switzerland		

which is keenly alive to the advantages of air transportation. Argentina, which followed Chile as a market presents good possibilities. Much of the terrain is similar to that in parts of the United States and our aircraft should appeal to civilian and army aviators whose interests lie over a hundred miles from Buenos Aires. Two American commercial planes are giving good service in that country. Last year an appreciable sum of money was turned over to two well known Argentine aviators, who came to the United States for a class capable of taking them from Buenos Aires to Spain. It is believed that only by demonstration can the Argentine market be opened up adequately.

Japan, the accompanying statistics indicate, purchased six airplanes at an average value of \$15,850. These were commercial types to be used for operation of an airline, signifying that a new field has opened up for our aircraft, as heretofore our shipments to Japan have been comparatively small and irregular.

During the first quarter of the current year the United States reported lost one airplane to a country from which no reported airplanes during 1928 (the last period for which airplane import statistics are available). It will be noted from the accompanying table that one airplane valued at \$12,200 was exported to England. In 1928 the United Kingdom was responsible for shipments of 23 airplanes to the United States. Fifteen aircraft were imported into this country from Germany last year while total imports of aircraft amounted to 50 airplanes at a valuation of \$126,653, indicating that the majority of them at least were of light, comparatively inexpensive, sport types. These imports will undoubtedly decrease in number as most of the types heretofore imported are now being manufactured in the United States under license.

Aeronautic parts were also shipped abroad during the first quarter in considerable excess of those for the same period of last year. Here again March was the peak month, when 80 countries purchased parts valued at \$122,081 during that month alone. Canada led all countries as the destination for this item during the first three months of the year, meaning that our neighbor to the north is really using the airplanes it buys from us. Canadian import figures show that 99 airplanes were

purchased from England during 1928 when the United States was responsible for 98. As Bristol "Moths" and "Avians" comprised the bulk of the purchases from Great Britain, those from the United States, although one has in point of number, were ever double in value of the 1928 imports from England. Canada is considered by most American airplane manufacturers to be a part of the domestic market. Nevertheless, every consideration should be given to its proper development and continued expansion. The establishment of servicing facilities, which will mean increased shipments of replacement parts, will have an important bearing on the future of the Canadian territory as an outlet for aircraft.

CHINA AND PERU—two countries far removed from each other, both economically and geographically—follow Canada as markets for parts. The first three months of the year have seen the shipment of at least five planes during the months subsequent to those for which export figures are available. Reports from there are encouraging for the expansion of commercial airplane sales and the fact that parts valued at \$29,060 were exported to China during the period under review is gratifying as an indication that progress is being made for servicing the American equipment now there. There is a possibility that the present very small airplane manufacturing industry of China will expand to the extent that a market will open up for engines and other components of American aircraft. Reports from Peru are encouraging, for the expansion of sale of commercial planes. The Canton district seems to be the best market at present. It is reported that the Canton Aviation Bureau has funds available with which to purchase between 24 and 48 airplanes annually depending upon the unit cost of this equipment.

The Provincial Government of Kwangsi may be expected to enter the market as general conditions and finances in that territory become stabilized. The Province of Kwangchow is also reported to have made inquiries about prices of American aviation products.

In 1927 the Peruvian Naval Air Service acquired a commercial plane over the Amazon jungle to the river port of Iquitos. Passengers and mail have been carried over this route with American planes since January, 1928. Other operations in the country are American operated which should mean a good outlet for future exports to that country, and is the reason for the appreciable shipments to Peru of spare and replacement parts.

Apparently such a condition is now in existence in Soviet Russia in Europe which imports no aircraft from the United States. It will be noted that Soviet Russia in Europe purchased parts valued at \$43,747 for transportation during the first quarter.

Germany and Japan were the destinations for 55 of the 57 airplane engines exported during the first quarter of the current year. The fact that in the corresponding period of 1928 but one engine was exported to such country, signifies that certain types of American engines are held superior to those of similar type and because power from foreign sources. The average value of the engines to Germany during the first quarter of 1929 was \$4,300 as compared with \$3,140 for those exported to Japan, meaning, perhaps, that among the aircraft engines exported to the latter country were a large of war surplus type. Both of these countries are as well Poland and Denmark, the third leading engine market, as well as American power plants in foreign airplanes.

THE PITCAIRN *Autogiro*



The Pitcairn Autogiro, which Earl A. Pitcairn, its designer, flew first Philadelphia to New York.

*A Non-Technical
Explanation of Its
Operation and
Performance*

By EARL D. OSBORN

way, having accident in which the rotor can be stopped in flight by jolting the machine in a direction which is so strong that the rotor will be violently vertical and in line with the path of descent.

To start the rotor turning, the machine has hitherto been moved along the ground. As the rotor starts which the rotor turns is raised back in relation to the fuselage and the line of propeller thrust, the rotor

DROP an airplane vertically and it will move forward even though it is held in a horizontal position which prevents it from assuming a normal gliding angle. If one wing of the airplane is put on back wheels and the plane again dropped, it will spin around.

This is the essential fact to be remembered in considering the principles of the autogiro. The aerodynamics of the machine are in reality completely unimportant, but of one remembers that it is an essential element of air dropped against the under side of the blades of the rotor when cause its rotation, it is much easier to understand how and why the machine flies. The forward motion of the autogiro only indirectly causes the rotor to turn. The turning motion is produced because the rotor is tipped back to the angle of flight and a certain part of the air flow caused by the forward motion strikes the blades from underneath and causes them to turn. If the rotor or wheel, as it is popularly called, were kept absolutely parallel to the air it would slow down but as soon as it did, the autogiro would start to sink and the air would again strike it from underneath and cause the speed of rotation to increase. The only

in third with its rear lower than the front. When the machine moves forward, the angle causes part of the wind to strike the blades from underneath and this starts the rotation. When the blades get rotating fast enough (i.e., about 30 or 50 rpm.), the machine is ready to take off. The climb is accomplished by having the machine tilted to a considerable extent as regard to the line of flight. If the stick is pulled to the back and the angle becomes too steep, the machine will begin to settle. This usually increases the upward action of the wind against the bottom of the blades, causing them to rotate faster. When the desired altitude is reached, the plane is leveled off, but the rotor is always kept at a slight angle to the path of flight.

In the first models of the autogiro which were built more than ten years ago the blades of the rotor were fixed. On all subsequent models, the blades have been hinged to the vertical shaft through the medium of universal joints which allow the blades to swing up and down and also to swing close together or farther apart. The universal joint, like the joint on an automobile drive shaft, allows movement in any direction but prevents rotation. Once the rotor has started to turn, centrifugal force tends to hold the blades out horizontally or

*An explanation of the autogiro theory was contained in an article by W. R. Boyer, Aviation, Jan. 12, 1927.

United States Exports of Aircraft Parts

Country or Destination	First Quarter	Second Quarter
Canada	\$10,420	\$11,210
France	1,110	40,240
Germany	1,110	10,210
Japan	1,110	10,210
Poland	1,110	10,210
Denmark	1,110	10,210
Sweden	1,110	10,210
Finland	1,110	10,210
Belgium	1,110	10,210
Italy	1,110	10,210
Spain	1,110	10,210
Portugal	1,110	10,210
Switzerland	1,110	10,210
Spain	1,110	10,210
China	1,110	10,210
Peru	1,110	10,210
Colombia	1,110	10,210
Venezuela	1,110	10,210
Argentina	1,110	10,210
Uruguay	1,110	10,210
Paraguay	1,110	10,210
Brazil	1,110	10,210
Chile	1,110	10,210
Ecuador	1,110	10,210
Costa Rica	1,110	10,210
Guatemala	1,110	10,210
Honduras	1,110	10,210
El Salvador	1,110	10,210
Nicaragua	1,110	10,210
Panama	1,110	10,210
Cuba	1,110	10,210
Haiti	1,110	10,210
Dominican Republic	1,110	10,210
Other countries	1,110	10,210
Total	\$10,420	\$11,210

rather at right angles to the shaft. Centrifugal force also tends to keep the blades equally spaced around the circumference of the rotor. However, when the rotor is running very slowly, or when it is idle, the blades would drop to the ground and might bunch together. (For storage the blades are all folded back arranged parallel to the fuselage.) To prevent the drooping and bunching while starting the rotor, it has been necessary to hold each blade up by a cable which runs to the top of the mast. It has also been necessary to keep the spacing of the blades by means of cables and shock absorber cord between each of the blades. As soon as the rotor starts turning, the centrifugal force keeps the blades in the proper position and the cables could be entirely dispensed with, which would increase efficiency and simplify the looks and simplicity of the machine. Especially while starting, to start the turning of the rotor, care must be taken to see that too much stress is not put on the cables.

THE FACT that the rotors are hinged on a universal joint in a point whose significance is not immediately grasped by those whose minds have been accustomed to think along lines of airplane construction. It means that the blades of an autogiro do not have any very great bending stress as do the wings of an airplane. Practically all the stress is in tension. The blades lift, but the lift is transmitted to the autogiro through means of centrifugal force. The lift of the blades tends to move them up on a vertical plane while the centrifugal force tends to hold them horizontal. The effect is much as if the autogiro were fastened to the middle of a rope. If the two ends of the rope were pulled apart, the machine would be raised up like the strains on the rope would be only tension. When the autogiro hits a severe bump or is pulled suddenly out of a dive, the lift of the wings becomes greater than the centrifugal force and the wings rise up momentarily above their normal position, but the forces on the hinges remain tensioned.

In the autogiro, the angle of incidence (i.e., the angle at which the blades are set in relation to the fuselage) remains the same but the angle of attack (i.e., the angle at which the blades meet the air) is varied by allowing the wings to move up and down. The result is that the blade which is going down, which is going approximately the same lift as the blade which is going up, is going the wrong way. The details of the aerodynamics involved are extremely hard to grasp, even without seeming to differ, but the general principle is that the blade going against the wind rises and remains more level from the top and less from the bottom. This decreases its angle of attack which decreases its lift. When the blade starts moving down wind, centrifugal force moves it down again, which means that more wind strikes it from underneath increasing the angle of attack and thereby increasing its lift. The wings are also longer so that their spacing can be changed and the blade moving against the wind tends to catch up to the other blade.

The autogiro which Harold Pizarro demonstrated at Langley Field on May 14 was brought over from England. The fuselage used is that of a two-seater Avro biplane with a Wright Whirlwind engine. Improvements are being made in the autogiro at a rapid rate and, in later models, the fuselage has been shortened and it is possible to start the rotor turning by pulling back the control stick, thus throwing the speedbrake up against the rotor blades. In Pizarro's machine, it is necessary to run around the field at a slow run until the rotor

starts turning at a sufficient rate to allow a take-off. This is a definite proportion, for until they get going fast, a jump while taking off will tend to break the cables supporting the blades. Also the blades get a rough treatment and it is necessary for the machine to be stopped before the take-off in order to let them smooth out. About three-quarters of a mile of slow turning is required before the rotor gets their required 90 r.p.m. (There is a counterforce on the rotor.) Judging by eye, which is a hard thing to do, the take-off with one person is about equivalent to that of a good OX airplane with two. The forward speed, however, is slower and though the rate of climb is not rapid, the angle of climb is probably better than that of an ordinary OX plane with an equal load. It is figured that the autogiro is about as efficient at these low speeds as an airplane would be which had the same plane form. Especially in planes of low wing loading, that is of low landing speeds, the efficiency drops off very rapidly as the aspect ratio is decreased. At higher speeds, this does not make as much difference in efficiency and it is claimed that the autogiro becomes very efficient theoretically at high speeds.

The best angle of climb seems to be achieved at about 45 m.p.h. and the best rate of climb at about 60 m.p.h. The slowest speed at which Pizarro's machine can fly level is about 30 m.p.h. Unlike the airplane, there is no danger in flying the autogiro at this low speed, if the speed is reduced too much, the machine merely settles. If on a take-off it is found that an obstruction will not



This Pizarro Autogiro, which is powered with a Whirlwind engine, used to land at Potomac Field, Philadelphia. Note that the rotors have been shifted the horizontal position assumed in flight.

be cleared, the pilot, or, one who has been flying autogiros and not airplanes, merely cuts the gas, pulls back the stick and waits for the machine to settle. The high speed of the autogiro demonstrated at Langley Field was about 60 m.p.h. This however was not at full throttle.

At the speed mentioned, the up and down movement of the blades increases and, in the present model, the blades would hit the horizontal stabilizer were they al-

lowed any more downward motion. Were this not the case, it is claimed that the present machine would hit 110 m.p.h. This would give a better speed range than is obtained on ordinary airplanes. It must also be remembered that the present autogiro is rather a crude construction and little attempt has been made to streamline any of its parts.

THE ATTITUDE CONTROLS hardly in reach the same way as those of an ordinary airplane. Banking is necessary on dives as the rotor is equally efficient when turning in any direction and would stall indefinitely. The

Right: A Pizarro Autogiro in flight over Potomac Field. Middle: The view of the 1928 race for the Navy's Cup.

Below: Flight record of a Pizarro Autogiro over the Potomac Field.



ailerons and tail surfaces remain possibly effective even though the machine is in a practically vertical descent. The downwash from the rotor is such that downracer attached to the stick wings go back horizontally showing that the stick wings do not reach the stalling angle. Although the machine can descend practically vertically a forward speed of 25 or 30 m.p.h. is usually maintained. The maximum gliding angle is about half that of an ordinary airplane—on other words, somewhere between four and five to one. This restricts the choice of landing grounds last, on the other hand, it is possible to land in a weak under air. The descent is a combination of a glide and a settling motion. When the plane comes within 15 or 20 ft. of the ground, the stick is pulled back sharply. The tail slides into first and the machine settles about two feet until the shock absorbers come into action. There have a play of about 15 in. and it is expected to increase this to 24 in. The maximum rate of settling in a vertical drop is figured at about 16 ft. per sec., approximately the same speed as that of a parachute and this should require about 18 in. of shock absorber travel

The landing very much resembles that of a bird. In the Langley Field demonstrations, the usual rate was about 40 ft. in practically still air and with shock absorbers which did not allow a vertical landing.

It is hard for one accustomed to think along airplane lines to adjust his mind to the autogiro. As pointed out in the opening of this story, the rotor needs practically no forward motion to keep it turning; in fact, it is very evident that, in descent, the turning speed of the rotor increases. Structurally, too, the airplane and autogiro are entirely different. The fuselage of an airplane is supported through its wings which are heavier struc-

tures, whereas the fuselage of the autogiro is supported through members in tension. These differences are of great importance and value.

At first glance one is strongly prejudiced against the autogiro because a rotating windmill does not look as if it were a useful piece of machinery for the support of a heavy structure. It looks clumsy and foolish in the air beside an airplane. It is also inefficient at low speeds. On the other hand it can fly slowly with no danger of stalling and it can descend practically vertically. First flight is eighty per cent of airplane accidents are blamed on bad piloting. This is another way of saying that piloting requires too great skill and precision. The autogiro is essentially easier to fly than an airplane. It cannot be stalled or spun. There is no difficulty about recovering a field. The angle desired is so small that the autogiro is almost judgmentless in extending or decreasing. If there is a crash it will be at such slow speeds that little damage is likely to occur. Due to its ability to fly slowly without danger, the autogiro can be flown in much clearer weather than is possible with an airplane. To those who have been accustomed to flying airplanes, their first flight in an autogiro is apt to be a little startling. When the autogiro is dropped back and the machine apparently goes in the air, it is hard to realize that this is a normal and safe procedure and not a stunt requiring great skill. We have become so accustomed to the intensity of landing fast and of judging height accurately that it is hard to visualize how much easier it would be to fly and how many more people would undertake it if these two elements could be diminished. The autogiro has set new standards of performance which are bound to stimulate flying.

CLEVELAND PREPARES 1929 National

By WALTER E. BURTON

IN PARLORS T and X of the Hotel Cleveland, Cleveland, O., Clifford W. Henderson, assisted by Maj. John Barry, superintendent of the Cleveland municipal airport, and a most competent staff is industriously engaged in the task of making all arrangements for the forthcoming National Air Races and Aeronautical Exposition scheduled to be held August 26 to September 2.

Three distinct courses of activities are being established, each one a national attraction in itself. First, there will be daily racing events, demonstration of planes, and other spectacles at the city airport on Buckeye road. There, in the \$100,000,000 municipal wilderness just off the public square, will be held an aeronautical exposition where the latest in airplanes and equipment will be displayed. The third center of interest will be the hotel front in the vicinity of the E. Ninth Street steamship piers, a few blocks from the downtown. Here, on the ground later to be occupied by the Cleveland stadium, an emergency landing field will be established. Every night, above this field, a flying circus will perform, and will be visible from much of downtown Cleveland. All kinds of lighting equipment for planes

airports and air routes; illuminated advertising devices, spectacular lighting effects, and so on, will be seen.

Cleveland city officials, Airport Manager Barry, and others interested in the city's air future are going to take full advantage of the opportunity to advertise the local airport facilities, aeronautical manufacturing and aviation opportunities, and general air-mindedness of the community. Therefore, an extensive program of improvement is well under way, and is to be completed in time for the races.

AS A MATTER OF FACT, there are two important general movements on foot which are tending to keep Cleveland at the top of the airport list. One of these concerns the improving of the airport proper, enclosure of the action to be made ready for the national races. The other includes preparations for the races and attendant activities. It is estimated that about 500,000 persons will attend the Cleveland events. Last year, half that number were present at Mason Field, Las Angeles, and 763 visiting planes with 5,000 landings were recorded. The Cleveland plane attendance is expected to reach 5,500, with perhaps 10,000 landings.

A visitor to the airport at any time this summer will be impressed by the burst of activity. On one side of the field he will see the new buildings going up. In

the rear, the airport and passenger terminal which is being erected by United States Air Lines at the Cleveland Municipal Airport.

On the other side of the field he will see the new buildings going up. In



FOR THE Air Races

almost every part of the commercial area, on the opposite side of the field, he will see new hangars being erected, adding to the already large group which constitutes the airport proper. Already a large hangar and office building for Universal Air Lines is nearing completion. A short distance away an equally new and large structure will accommodate the United States Air Lines. These two buildings are more elaborate than anything else on the field.

Typical other structures is the new administration building which will be the nerve center of airport life. Here Mayor Barry will hold forth as airport manager, sharing the building with the weather bureau men and other officials. The structure is two stories high, and is surrounded by an octagonal observation tower from which a commanding view of the airport can be had. There are other buildings to be completed before the races.

One of these is the new hangar of Skyways, Inc., of Ohio, which is just getting under way. Ground soon will be broken for hangars of at least five other companies, Mayor Barry says.

Not new hangars are not the whole story, even if they do represent \$250,000 worth of improvements. The city has started to spend twice that amount for general airport betterment, exclusive of race projects. The northern half of the airport is to be tilled in. A half million square feet of concrete will be laid in the form of apron and taxi strips. And these taxi strips are not runways, Mayor Barry points out.

An elaborate drainage program is being carried out. This includes the laying of 15,000 ft. of 12 in. sewer, 6,000 ft. of 48 in. pipe, and 260,000 cu. yd. of French drain. In making the various improvements, 70,000 cu. yd. of dirt will be moved. There also will be other grading, beautifying of the grounds, and incidental work



Mayor Barry, second from left, and Clifford W. Henderson, who is president of the local organization supporting the 1929 air races.

to be done in order to get the airport into first-class shape.

Activities connected with the air races will center at the western side of the airport, directly opposite the present hangar colony, and will interfere in no way with regular commercial and mail activities at the field.

Development of an extensive race program has been started. Those in charge of this work include Mayor Barry, Mr. Henderson, and city park board representatives.

All events will be visible from a grand stand seating 30,000 people. The stadium, of course, will not be covered. Box sections are to be included among the seats. As the race usually takes place with grandstands, there will not be a great difference in the dissimilarity of seats, for a person in the rear row can see and hear as well as one in the front row.



The design adopted for the new stadium. Above the air races and exposition.

THESE OPERATIONS are being carried out to accommodate racing, Navy and civilian fliers are included in the racing group. Those that will not be hangars for the housing of airplanes, but will contain space for the storage of paraphernalia and other equipment, instruments, and the like. Control of races and other field events will be centered in a general operations building put up for the purpose.

Grading of this section of the field has been started, and will include, before it is completed, the removal of 80,000 cu. yd. of dirt and the laying of 10,000 ft. of drain pipe. The city park department will carry out an extensive landscaping program which will make the racing center a beauty spot.

Actual erection of buildings is to start June 15, following preparation of the ground.

The City of Cleveland is receiving the right to retain the race buildings as permanent airport equipment, although they are being erected primarily as temporary structures.

Two main problems, each of its own peculiar type, must be solved in advance by promoters of the races.

On a this. How to handle the thousands of automobiles that will pour in daily from every part of the country. The other problem is the regulating of flying and ground movement of planes while the races and aviation events are in progress. Every effort will be made to avoid accidents.

As for automobiles—parking space near the airport for 35,000 cars is being provided. Undoubtedly, accommodations for thousands more will be operated by private interests within a radius of a few miles. Out very traffic regulations are to be enforced on roads leading to the parking areas. During the business days, cars will be permitted to travel only toward the main center. In the afternoon, the order will be reversed, only outgoing cars being allowed to move. This one-way arrangement will permit motorists to travel in almost any direction. In this way, it is expected that a rapid flow of traffic will be made possible at such large assemblies will result.

The taking off and landing of planes in a congested field will be regulated, with safety to everyone concerned as the paramount objective. Proper timing of arrivals will partially take care of this. For instance, a certain period each afternoon will be set aside for the demonstration of aerobics. During this interval, no other flying over the exhibition area will be permitted. Operations at the commercial side of the field will continue, however, as usual. The racing center and commercial landing space are far enough apart—being on opposite sides of the 1,000 acre field—that no interference will result.

As spectators will be at the airport practically the whole day, something of interest will be arranged for every minute, with not a dull moment in the program. An official band will offer concerts daily. One of the attractions planned is a series of exhibitions by groups of small dirigibles. The Goodyear-Zeppelin Corp. of Akron has indicated that it will send its fleet of fully manned, non-military blimps but perhaps leading five of the new six were held. The Army and Navy have been asked to send dirigibles, but have not replied. A dirigible race between Army and Navy and Goodyear ships is being arranged as one of the features of the show. It will be the first contest of its kind ever staged.

AVIATION June 23, 1929

The one drawback to the bringing of dirigibles to Cleveland is the lack of hangar space and landing facilities. That, however, does not seriously affect Goodyear ships whose home hangar at Akron is less than an hour distant.

There will be many other program events, the details of which have not yet been worked out. One of these will be a glider exhibition. Progress of races and information concerning other things will be broadcast to the crowd over a public address system. Those unable to attend the races in person will be able to hear important parts over the National Broadcasting System.

Nearly every manufacture of the aircraft and allied industries will be represented at the aeronautical exposition in the Public Auditorium. Space is being assigned to exhibitors at an unprecedented rate, according to Mr. Henderson. In all, there will be 300,000 sq. ft. of floor space occupied by exhibits. This is 40,000 sq. ft. more than the largest aeronautical show previously staged.

It is highly significant that individual space reservations are, on the average, 100 sq. feet larger than those made at any other air show. This, leaders of the exposition declare, indicates that the Cleveland event is regarded as the most important aeronautical show ever held. It is estimated that at least 300,000 people will visit the auditorium during the show. Preparation of such a large building as the auditorium involves a tremendous amount of work. Exhibits will be moved into the building a few days before the opening. An elaborate system of doorman will be required.

Aside from its usefulness as an emergency landing area during night maneuvers, the temporary landing field to be laid out on the shore of Lake Erie is expected to serve a valuable purpose. Because of the proximity of large buildings and the presence of masses of spectators, automobiles and other objects during show hours, no regular highways, especially with large planes, will be arranged. But the fact that there has been considerable talk in Cleveland about a permanent lake front airport that would supplement the present one eight miles away, and would serve the downtown

AVIATION June 23, 1929



Shown: The passenger stairs and hangar of Val-veer Air Line in the corner of construction at the Cleveland Municipal Airport. Below: The steel structure for the automobile building at the port.

section directly, leads spectators to the emergency field. The feasibility of landing and taking off of airplanes in daily commercial service will be studied, and it is probable that each week's data, that can be used as a guide to the event a permanent field is built, will be produced. Of course, the area to be occupied by the emergency flying space, during the exposition would not be available because it is the one for the proposed Cleveland stadium.

A large number of hangars, and probably several flying boats and seaplanes will come to Cleveland during the two day aviation festival. Accordingly, a section of Lake Erie made the breakwater will be designated as a landing area for such craft. Limited facilities already are available for landing planes out of the water and on the beach over a landing platform.

The most prominent work is going on as a prelude to the late summer event. A ticket-selling contest with substantial prizes, is one of the attractions. Thousands of banners, letter cards and windshield stickers have been distributed. Cleveland motorists have been one audience for the displaying of posters.

Not long ago it was assumed that reliable persons and firms desiring stadium for the races and exposition could obtain a trophy by selling or otherwise getting in touch with Mr. Henderson's office. Soon afterwards, the air race headquarters was flooded with requests from all parts of the United States.

Final opening of the ten day series of events will take place on August 24, at the Public Auditorium. The first spectacle will be a tremendous flower parade through downtown Cleveland and finally along Euclid Avenue and to the auditorium. Following this will be the opening ceremony whose details have not been given yet. Army, Navy and Government officials, Governor Myers, V. Governor of Ohio and other notables have been invited to attend.

And then things will begin to happen at the auditorium, airport and lake front. Auditorium doors will be open from 10 A.M. to 10:30 P.M., the airport grounds will be open all day, and the lake shore will become the center of attraction after daylight.

Persons traveling by automobile to Cleveland can approach the municipal airport without going through the congested downtown section. The field is located on Broadpark Road, southwest of the city in fairly open country. Main highways from the east, west and south,



as well as from the city proper, lead to it. If the downtown is the public auditorium, the material should go directly to the public square at the heart of Cleveland. The auditorium is a short distance north and east, toward Lake Erie. Numerous parking grounds and garages are nearby. The emergency landing field over which right operations are to be held is a little farther to the southeast, at the edge of the lake. It will be visible from a considerable area of high ground bordering the flat, lake-level portion upon which it will be situated.

As for visitors who go by plane—the municipal airport should be the objective. Although nothing definite has been announced, landings doubtless will be made on the regular commercial portion of the field, near the eastern edge, leaving the racing center open for other activities.



The Cleveland Municipal Auditorium which will house the aeronautical exposition to be held in conjunction with the air show.

PERSONNEL

JAMES H. WALKER has been named Controller with the Central Flying Service based at Oklahoma City.

THOMAS L. LARSEN, formerly with the Royal Flying Corps, has been named operations manager of the Bristol division of the Universal Air Lines in the Southwest. He will replace JOHN ANDERSON and WILLIAM BUSH who have been transferred to Chicago.

GEORGE T. RUTLAND, formerly assistant operations manager of the National Aeronautics Corporation's Universal Aviation Corporation, has been appointed manager of the Chicago City, Kan., where he will have charge of operations at this station on Universal's new transcontinental air-rail route.

GEORGE B. BERRY has been named president of the Both Aircraft Corporation at a directors meeting held June 18. Other officers announced were: L. MONTAGUE BERRY, vice-president and general manager; J. L. GRANT, vice-president, and J. E. PATTERSON, secretary.

In addition to these officers, the directors include, GEORGE H. HALLER, Chairman; H. B. BERRY, Vice-President; H. J. BERRY, President; JAMES W. PATTERSON, Vice-President; and C. W. WHITE, sales manager.

CLARENCE BRIDGES, operations manager of the United States Air Lines, has been elected president of the Central Air Transport Operators' Association. He succeeds G. G. JURY of the South Air Lines who has been transferred to the Chicago office. J. H. HARRIS, of Clifford Bick, Inc., was elected secretary-treasurer.

LEONARD WALKER, of St. Louis, and CAROL BATTLE, of Tulsa, Ok., have joined the staff of the Universal Flying School at Lambert-St. Louis Field.

C. C. STINE has been elected president of Grand Central Air Terminal. Other officers are: J. L. MALLORY and C. A. STINE, vice-presidents; and DONALD W. MALLORY, secretary-treasurer. DONALD W. MALLORY, W. D. JENSEN, D. C. WALKER, D. C. TOWN, JACQUES VANDERKAM, and R. V. UNDERWOOD.

RAY B. WELLS has been appointed assistant manager of the Los Angeles Municipal Airport.

O. B. DOW, Jr., has been appointed supervisor in the school division of the Waco Aircraft Corporation, Michigan.

JOHN WALKER, formerly with the International Aircraft Company of Long Beach, Calif., and the Masser Aircraft Company of Los Angeles, has joined the sales staff of the Warburton-Bell Aircraft Co., Inc., of Marshall, Mo.

LEONARD H. GOSSETT, formerly with the Chicago-based company of Mitchell Field, N. Y., and will now take up his duties at Lake Fort, Hawaii, on July 21. Major N. H. BROWNE is in charge of Mitchell Field.

ERNEST BERRY, Jr., has been appointed sales manager of the Winbury Manufacturing Company.

R. A. BRADSHAW and HARRY M. LAINE have been elected to the Board of Directors of the General Aviation Corporation, Ltd.

CARL MAX A. SMITH has joined the staff of Ford, Bessie & Davis, Inc., 1110 E. Jackson in his new position.

MARION "BOB" GUNDEL has been promoted to active operations manager of the entire organization of The Aviation Corporation.

T. D. BARNES, sales manager for the Universal School at Memphis, Tenn., Room 9, Midway, of Midway, has been made assistant at the Robertson General School.

DONALD STANLEY MONTGOMERY has been appointed executive assistant to the president of Fairchild Aviation Corporation.

RAYMOND R. RICE, for two years staff photographer at the St. Louis Gateway, has been appointed chief photographer for Universal Aviation Corporation.

GEORGE F. MONTAGUE has been made assistant treasurer of the General Aviation Corporation.

WILLIAM O. QUINN of Berkeley, Calif., and E. F. BICKLEY, of St. Louis, Ohio, have been appointed regional managers for the Air America Agency.

A. S. ANDERSON, of Miami, Fla., has been appointed airport manager for the Pan American Airport.

ROBERT L. KIRKMAN, of Syracuse, N. Y., has been appointed manager of the Syracuse Airport.

ROBERT L. KIRKMAN and JAMES KELLY have been appointed jointly as the General Aviation Corporation's regional managers for the St. Louis Airport.

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SCHOOLS AND COLLEGES

RAYMOND A. THOMPSON's first air school will be opened at Oakland, Calif., airport, it is announced. A complete ground course will be offered as well as flying instruction. September 1 is the approximate date of opening.

GENERAL AVIATION CORPORATION's development school at Minneapolis, Minn., has been moved from Thompson's location to new quarters at 1813 Fourth Avenue. Six approximately \$6000 will be spent for remodeling and new equipment. Night students will use the new quarters, while the day classes will be conducted at Wood-Clamilton College.

AERO AND AUTO ENGINEERING, Inc., will offer courses in theory and shop practice in a new school started at Tulsa, Ok. Night as well as day classes will be held.

General Flying Service is preparing planning a branch at Jacksonville, Fla., with a flying school out of the Institute.

UNIVERSITY OF WASHINGTON achieved the opening of aeronautical courses in its new school at Seattle, Wash. The school is now open for the fall semester. The school is now open for the fall semester.

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AIRPORTS AND AIRLINES

Aviation Radio

Licenses Granted

WASHINGTON (AP) —

Thirty-two

applications for

airplane and

aeronautical

radio licenses

were granted

by the Federal

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yesterday.

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FOREIGN ACTIVITIES

More Records
Reported in Europe

BERLIN (Continued)—Chief Pilot Rüdiger Störck of the Heinkel, Allgemeine Weser, claims to have established a speed record for a airplane carrying a useful load of 3,000 kg. (about 2,200 lb.) over a distance of 2,000 km. (about 1,250 mi.) on June 11. This speed is reported to have averaged 222.27 km (138.11 mi.) per hour. He covered the entire distance in 4 hr. 26 min. 30 sec.

Two records have been homologated recently by the F.A.I. at Paris. Gerd Gieseler, Germany, is credited with a speed record with a payload of 1,500 kg. at the rate of 344.51 km. per hr. on May 25. Hans Thiele, Heinkel, also powered the BMW 600 hp engine. The record formerly was held by Hans Stephan, Cessna, U.S.A., at 147.263.

The record for carrying the greatest load is a Lockheed in an altitude of 2,800 m. (9,167 ft.) over the Piste Stendard, who on April 17 climbed to this height with 14,220 kg. in a Lockheed Constellation, powered by three BMW 240 hp engines.

China Transport Lines Delayed

SHANGHAI (Continued)—Establishment of the air transport system which was to be undertaken in the country by American Engineering Company, Inc., of the Canton substation, is reported to have been delayed through friction in the Maritime Commission's handling of the service. Negotiating with American Airlines, Douglas and Douglas, are to be opened.

Special Survey Plane Built

LONDON (Continued)—Intensive aerial charting and surveying of British Dominions will be made considerably more thorough due to the use of a special all-metal two-engine light aircraft completed by the Glaser Aircraft Company, Chesham, for the Air Survey Operating Company, Ltd. The pilot sits in the nose of the aircraft; the photographer has a compartment in the rear, and back of him is a dark room for developing film. A Victor aircraft engine electric motor is used.

Great Flight to U.S. Postponed

FRIEDRICHSHAFEN (Continued)—According to the latest announcement here the cruise to the Great Lakes by a German jet will not be completed in time to allow a second trans-Atlantic flight before the scheduled start of the world flight. Therefore, the flight directly to the United States will be postponed until the post-war cruise. The date and arrangements for which have been definitely arranged.

Completing 60-Place Bomber

FRIEDRICHSHAFEN (Continued)—A 60-passenger Douglas jet bomber powered with twelve 280 hp engines and capable of a maximum speed of about 350 m.p.h. is reported to be ready for flight tests in July according to a local announcement. The machine will have a span of 337 ft., length of 147 ft. and weighed less than 22 tons. It is being built for ocean travel.

Foreign News Briefs

Several of the S-55 flying boats at the London, Ontario, air show, were viewed at Cranston, Somerset, June 12, during a violent storm.

A strike of air traffic is reported to have delayed construction on the British airport, E. R. 100, according to recent dispatches.

Following damage to his tri-engine Fokker at the Dan Don aerodrome, Chesham, India, Vice Lord Black, Balacon publisher, has abandoned his proposed flight to Tokyo and return. This is the third time Black's air has been interrupted by accident.

Twenty-five flying clubs have been organized for use in the post-war aviation in New Zealand under the government subsidy plan used in other sections of the British Empire, according to reports.

Construction has been started on the first unit of the Vancouver, B. C., plant of Boeing Aircraft of Canada. The plant will cost around \$200,000.

Airports were opened at Kingston, Ont., June 4, and at Hamilton, Ont., June 5, with elaborate ceremonies.

Under the auspices of the Army Civil Service, Ohio, civilian flight courses have been organized. The course costs \$200.

About 15,000 persons are said to have attended the annual air meet held by the Ontario Flying Club on June 3 at Ottawa, Canada.

Reports and unfavorable weather have prevented the Swedish fleet from carrying their flight to the United States from Stockholm, Sweden, where they landed for fuel and repairs after the forced landing at Shannon on June 10.

During June, July and August the R.13-1 will fly the first time into the Grand Canyon. Various business can have expressed the desire to cover long distances on Sunday, in order to live in little time as possible. This need was especially felt in the London-Milan line.

At Rome, Italy, service considerations in lower gears is a one-stop flight from Rome to New York, with General Staff Balacon secretary of state for air, to chief pilot according to reliable sources here. The machine, being completed by the Balacon company, is a three-seater of the S-54 which flew from Rome to Bristol in 1928. It is equipped with a Fiat 4.22 engine of 350 hp and has about 85 hp range.

THE BUYER'S LOG BOOK



Cincinnati Lathes

AMONG recent developments of the Cincinnati Lathe & Tool Company, 3257 3211 Dunes St., Oakley, Cincinnati, O., are a series of lathes in sizes from 16 in. to 32 in. diameter, of either the cast or ground bed type for belt or motor drive. In the latter Cincinnati ground bed lathes, the motor is mounted inside of the lathe under the headstock or on the rear of the column bed. It is supplied in the 16 in., 18 in. and 20 in. sizes and in several lengths of bed from 6 ft. up. All of the drives, however, are self-contained units, permitting removal of the machine with the motor as a whole to any part of the shop.

Twelve positive mechanical speed changes covering a carefully selected range for all precision purposes are secured easily by simply shifting one or more of three levers, conveniently grouped at the front of the lathe, any lever may be shifted without interfering with the other.

All of the gears in the patented headstock are contained in the lower half of the housing made from forgings of special manganese chrome alloy steel, heat treated in oil and ground. Cutting the teeth with special cutters prevents gear marks appearing on the work. This extra mechanism operates continuously in a bath of oil.

The "quick change" gear box is a complete unit mounted on the front of the lathe. It provides an entire range of finishes and speeds by simply shifting two levers. The metric range is covered by providing 32 changes to cut 1 to 50, and speeds per inch in 0.001 from 0.004 to 0.200. More than 400 may be cut.

While silent chain drive is recommended by the manufacturer, these lathes may be supplied either geared or

G. E. Oil Heating Unit

IN ORDER to provide a reserve of warming energy oil to facilitate starting in cold weather operation an electric heating unit has been developed by the General Electric Company, Schenectady, N. Y.

The new electric heating unit consists of two 110 volt, 275 watt heating units conveniently shaped to fit into com-



Photograph of the General Electric oil heater with two 110 volt, 275 watt heating units.

ventional aircraft oil tanks by insertion through the filler caps. Three degrees of heat are provided. The units can be operated in series for low intensity, they can be used as a single unit for intermediate intensity, and they can be operated in parallel for high intensity. The corresponding ratings values are 387, 375 and 750 respectively, at 110 volts.

The new unit is provided with a convenient type of snap switch to give the necessary control for the three heat—It is also equipped with a 25 ft. length of cord.

Improved Aviation Lamps

A NEW method for clearing the interior of the glass of high-powered aircraft lamps has been developed by the lamp development laboratory, Instrument Lamp Department of the General Electric Company at Cleveland, O. This method has been applied to ten- and high-capacity lamps including the 1,500 watt, 32 volt, 2,000 watt, 32 volt, 5,000 watt, 115 volt, and the 30,000 watt, 130 volt lamps for aviation service.

The deposit removed consists of a telephoto-like coating (magnesium powder) inside the lamp before it is sealed. While the lamp has become thickened from use, the operator merely needs to remove it from its socket, invert it, burn it several times in order to bring the tungsten powder into contact with the black deposit and the lamp is restored to its former efficiency.

Desoutter Company Builds Light Cabin Plane



LONDON (Continued)—Manufacture of the Desoutter "Dagblat", three-place, side-by-side, monoplane, has been started at Graydon. The machine was designed by Frederick Desoutter, the English Company building world records for the machine. It is powered with a Macchi C.18 engine, 55 hp, and has a span of 27 ft., length of 27 ft. and a weight of 7 lb. Empty, it weighs 960 lb.

and loaded 1,730 lb. The high speed is 182 m.p.h., cruising speed 158 m.p.h. and landing speed of about 52 m.p.h. A climb of 11,000 ft. in 20 min. is claimed, and a ceiling of about 18,000 ft. Its normal cruise is about 500 mi. with a fuel capacity of 20 gal. The fuel consumption at cruising speed is 4.35 gal. The machine is priced at about \$2,750.



One of the General Electric oil heaters manufactured by the General Electric Company.

Butler Refueling Trucks

A NUMBER of completely equipped refueling trucks are now being completed by the Butler Manufacturing Company, Kansas City, Mo., for use at the airports of Transcontinental Air Transport, Inc. These units employ the facilities of the most complete water cut filling stations and are especially designed for rapid service.

With the use of these water, oil, gasoline and air can be supplied to planes through the use of power from the engine of the truck upon which the unit is mounted. Emergency hand pumps are installed for use in the event



A side view of one of the refueling trucks built by Butler for T. A. T.

of failure of the engine. Only one man is required to drive the truck to the planes on the field and service them completely.

Each unit consists of a G. M. C. truck powered Type 4008 truck on which is mounted a 750 gal. gasoline tank and a two-compartment lubricating oil tank fitted with heated coils which take heat from the engine exhaust. The lubricating oil compartments are equipped with thermostats enabling the serving of oil at the same temperature as the oil already in the engine of the airplane. This feature avoids warming up after taking on a new supply of oil.

Other equipment consists of a series of floats, liquid measuring system, safety valves, floodlights for night servicing, portable trouble light for night inspection of planes, coupler for towing airplanes, fire extinguishers, air pressure gauges, air gauges and oil dispensing hose.

On top of the truck (when control compartment) on the side are built rubber covered platforms from which servicing even the large tri engine planes can be managed.

"Levelometer"

THE "Levelometer," manufactured by the American Airplane Equipment Corporation, 613 Bay Building, Oakland, Calif., is an instrument designed to indicate accurately and accurately the angular position of an airplane in rolling and pitching movements. This instrument operates in any angle or speed of roll or pitch without measuring. It is simple in construction and has no parts that are likely to get out of order or require adjustment. The overall diameter is 4 1/2 in. and the weight complete is 2 lb.

The Levelometer consists of two dials indicating each having a circular disk set in a protecting aluminum case

One portion of the case is fastened to the instrument board for measurement and the other opened by means of a hinge in an angle of 90 deg. for longitudinal use. The case is rigidly locked in either a closed or open position by means of a thumb-screw hinge pin. The levelometer can also be furnished in the form of two separate dials for individual attachment.

The bubble in the circular tube remains in position continuously at the top of the circle during every movement of the airplane and the variation in normal flight position can be instantly read from the dial. There is a clear unobstructed field of vision around the entire circle. The fluid employed will not freeze at a low temperature.

The instrument is designed to withstand vibration according to the manufacturer. Use of a circular tube makes it possible to register any angle of inclination.

Syracuse Irregular Belt Sander

DESIGNED to eliminate hand sanding of intricate shapes, the Syracuse Irregular Belt Sander, Type C-6, should find many uses in aircraft factories. This tool is manufactured by the Porter-Cable Machine Company, Syracuse, N. Y.

The irregular belt sander bears a resemblance to a hand sander and is operated in a somewhat similar manner.

The belt passes over a pad directly above the table against which the operator works. As the belt runs in a vertical direction, the work can be moved very easily. Pads can be furnished in any material, thickness and degree of grain. Width of belt varying from 1 in. to 5 in. may be used depending on the requirements of the particular work. The design of the machine is such that any length of belt from 25 in. to 175 in. may be used. This allows more room for larger work when necessary to swing it back of the belt and also gives greater flexibility and ultimate economy. For work requiring a very fine finish belts with extra flexible backing are employed.

Power is transmitted from the motor to the drive pulley by a belt which, together with the rubber covering and the pulleys over which the abrasive band travels, allows quiet operation. The Type C-6 Sander can be equipped in two speeds—1,375 ft. per minute for wood or 3,435 ft. per minute for metal.

This unit is portable and operates from a lamp socket or power line. The net weight is 265 lb. and the shipping weight 300 lb. The table is 13 in. by 19 in. in size and is 34 1/2 in. above the floor. The overall dimensions of the machine are 65 1/2 in. by 22 in. by 27 in. Equipment includes the 4 hp. belt bearing motor, six belts, flexible pad and switch.

The company also manufactures a complete line of machine tools and sanding machines for various purposes.



The flexible belt sander designed by the Porter-Cable Company.

ANNOUNCING

the change of our

Corporate Name



IN order to associate more closely the name of our company and our product, the corporate name of The Advance Aircraft Company has been changed to the Waco Aircraft Company.

This change in no way affects the ownership, personnel or operation of our organization. WACO remains WACO—the largest-selling strictly commercial airplane in America.

THE WACO AIRCRAFT COMPANY
TROY, OHIO

Priced from \$3,200 to \$10,000

... fully equipped ...
Bureau, WACO Field.



"ASK ANY PILOT"

LIGHTING OF THE



Type DCE24



This new revolving beacon was built by Crouse-Hinds Company to meet the specifications of the United States Department of Commerce and is the government standard for use on airways.

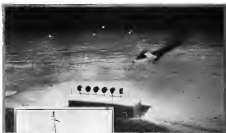
This beacon can be furnished with a magnetic lamp changer and search lights which enable the aviator to locate the beacon after he has passed over the main beam.

Everything in lighting equipment for airports and airways.

Candels - Floodlights
Traffic Signals - Flares and Beacons
Airport and Airway Lighting Equipment
Groundlights - Strobe

CROUSE

NATION'S AIRPORTS



Type DCE24 airport floodlight is ideally suited to lighting the landing area of an airport. It can be used in a bank system with from 3 to 8 floodlights grouped together and the beams overlapped, or in a distributed system with floodlights spaced 150 feet apart along the side of the airport.



Type DCE24

Everything in lighting equipment for airports and airways.

- HINDS

CROUSE-HINDS COMPANY

NEWARK, N. J. U. S. A.

NEWARK, N. J. U. S. A.
NEWARK, N. J. U. S. A.
NEWARK, N. J. U. S. A.

A LEVIATHAN *of the* AIR

Everything about the Commodore, sister-ship of the famous Consolidated Navy Patrol Plane, PY-1, is on a huge scale. Its overall length of 66 feet—its wing-spread of 100 feet—its super-horsepower—its great load-carrying capacity including pilot—assistant pilot—mechanic and steward—commodious passenger accommodations—cargo space of 200 cubic feet for mail and express—and fuel to fly 1000 miles at well over 110 miles an hour . . . truly make it a modern Leviathan of the air.



Equally great are the Commodore's pay-load and profit possibilities for the transport operator in territory that by topography and flying conditions makes the use of flying boats desirable. The Commodore can land and operate in any kind of weather—minimizes overhead and upkeep—and in every way fulfills the need of economical air transportation . . . wherever there is water. Write today for full particulars . . . and a comprehensive survey showing the Commodore's operating costs . . . and high profit-making possibilities in commercial air transport.

CONSOLIDATED - AIRCRAFT - CORPORATION - BUFFALO - N - Y -

The COMMODORE

TABLE 1007. See preceding table. (Continued)



**Sycolec
Steel Tying**

U S Army Quartermaster
Box 17 086 Chicago-Maryland
Chicago, Ill. Request
sample size for interior
claystone also steel tie
rod.



Oil Pressure Gauge
Suggested retail price: \$14.95. Full
assured to be correct
and accurate. Heavy
duty. 1/2" x 1 1/2".
Electrically operated.
Sold as such \$8.95.



Shrubbery
Add evergreen shrubs, green
and woody shrubs, dwarf
and medium. (See page
and include with various
planting as presented by the
author.)



**Fullersbury
Langes**
First quality trout
Quaint camp from 44
117 degrees F. Fully de
seasoned, each \$10.00



Colony
Spill Thimbles
Standard Air Cross Spill
Thimbles. Made from a
steel wire and protected by
a plastic coat. All sizes.



Spanner Cops
Specially joined and fitted
together. Most sizes, now
\$1.00.



Clivia Fine
Wrote in *the* Crisp special
columns. Guaranteed to
come absolutely page-
high quality material! See
page next.



Navigation Light
 Standard astern red
 passing astern white
 starboard green
 port green
 white, 360°

Robertson
Dependability
is
nationally known

Nowhere more than in the aeronautical industry is dependability more important. Rigid government inspection, if not safety itself, makes it essential that all airplane parts meet AN specifications or conform to the standards that commercial acceptance has set.

You can depend upon parts and supplies furnished by Robertson to meet all requirements. You can depend upon Robertson to make prompt delivery from complete stocks—to sell, in most cases, at prices below all others—to stand behind every sale with a money-back guarantee.

The name Robertson is no new one in the industry. Throughout the renewed development of aviation, it has stood for dependability. Dependability accounts for Robertson's remarkable growth. And Robertson's future program is definitely dedicated to dependable service.

The new Robertshaw parts catalog is now ready for mailing. If you have not yet sent for your copy, do so today.



Dept. W-6
ROBERTSON AIRCRAFT CORPORATION

Lambert-St. Louis Airport, Anglin, St. Louis County, Mo.

Phone: 415.275.2725

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DIVISION UNIVERSAL AVIATION CORPORATION

more active. Indeed, the *in vitro* studies with the *in vivo* results

Copyists have
failed to match
its amazing

Performance

SINCE the famous Avian first took the air in 1925 and began a spectacular flying career, many designers have sought to copy this popular light plane. They have built many others, closely resembling the Avian. But they are no comparison as soon as they leave the ground. In the air there is no comparison to the original.

For the Avian is simply the happy creation of designing genius. A long record as a sleek plane, as a sportsman, has given the Avian unquestioned right to its present position of leadership among light planes.

Perfectly balanced, stable, airworthy under all conditions. Safe, far beyond the fastest demanded and accepted by the Federal authorities. Dependable, steady

enough for any man—the Avian is the experienced flyer's choice.

In its the building means the air is lower down. Laid in the comfortable security of the ship's design, the sportsman (and he doesn't have to be such) soars through the sky, easily, pleasantly, riding off risks that are lesser than most—risks that are inexpensive and expensive.

Now this light plane is produced in this country under sole royalty rights as the Whitley Avian.

More Convincing Than Talk

All we can say about the famous Whitley Avian is nothing compared to what this ship will tell you when you fly her.



Glance over the rosy cockpit. Give her the gas. You never had a ship get away and climb faster. Soar it. Try to show her into a spin—and watch the Handley-Page wing slow motion, grab the air and literally lift the seat of the ship. Spin her out in a Whitley Avian. So are side slips. Flare into a landing. Master the low stalling speed. See how simple it is to put the Whitley Avian down in somebody's backyard. Taxi along rough ground and watch the steady, well-tracked undercarriage take the bumps!

If you're an instructor, meet an build-

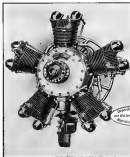
ing an excellent reputation as a safe flyer, as a efficient teacher when making money—if you're a sportsman who wants to fly for the thrill of flying and would like to keep your ship in any old shed—give the Whitley Avian more than a glance. It's the ship for you. Its price complete, flyaway at \$10,000. Bridgeport, or \$5,000.

A word of warning on your part will keep you detailed information concerning this popular light plane, its history, its specifications, its performance.

There's Money To Be Made

We are proceeding with national distribution. Each territory is still open to separate dealers and distributors. For complete information concerning representation, sales plan and detailed story of this famous light plane write the Sales Manager, Whitley Mfg. Company, Department Two general office and plant, Bridgeport, Connecticut.





LEFT: Six-cylinder LeBlond radial engine, used by TWA, is made and built by LEBLOND AIRCRAFT ENGINES, Cincinnati, Ohio.

BELOW: Nickel Alloy steel connecting rod assembly of LeBlond aircraft engine.

Superior strength and low weight of LeBlond products!



NICKEL ALLOY STEEL

used for 26 highly stressed parts of

LEBLOND AIRCRAFT Engines

The LeBlond aircraft engine, the first in its class to pass the grueling fifty-hour U. S. Navy test, is specially designed to provide fast assembly and disassembly, save power and low operation costs. Twenty-six highly stressed parts of the LeBlond engine are made of Nickel Alloy Steel.

Extensive tests have shown that the strength, maximum and minimum values of Nickel Alloy Steel vary very little from heat to heat than other commercial steels. In the manufacture of this engine, where it is impossible to test the individual properties of each piece of steel used, this feature is particularly important.

Probably the most impressive evidence of the uniformly dependable mechanical properties of Nickel Alloy Steel parts is the fact that practically all manufacturers

of airplane engines, both in America and Europe, have adopted Nickel Alloy Steel for highly stressed parts, the weight of which must be pared to a minimum.

Information on the properties and applications of Nickel Alloy Steel will be gladly furnished by our staff of engineers.



Nickel Alloy steel connecting rod of LeBlond engine.

Nickel

FOR ALLOY STEEL

Nickel Alloy Steel Parts of LeBlond Aircraft Engine

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Cam drive gear
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"Dippers"
Piston pin
"Wrist pin"
Cam follower roller
Transfer bush bolt
Gudgeon pin
Oil pump drive shaft
Oil pump drive gear
Valve spring washer
Cam drive shaft
Cam timing finger
Master connecting rod
Connecting rod link
Connecting rod bush
Rocker arm
Propeller hub key
Screw
Crankshaft
Cam
Cam follower
Piston and wrist
Cam drive of the shaft
Piston and link and

*These machined with nickel on Nickel Alloy Steel, but not all Nickel Alloy Steel.

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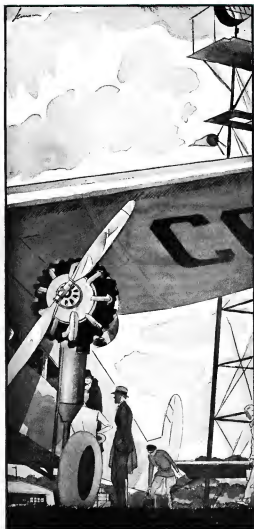
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THE number of excellent flying fields in America is increasing so rapidly that even in listing them the Department of Commerce has difficulty. Something of the same sort is true of Wright engines. The average man thinks automatically of Wright when he thinks about

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Wright engines . . . and modern, conveniently located airports . . . have done as much as any other factors to build up confidence in flying.

Statistics show that approximately thirty-five per cent of all the airplanes in America are powered by Wright. This, of course, is most impressive proof of Wright efficiency and safety.

Ninety-four per cent of the parts for "Whirlwind" motors are interchangeable. And the twelve regional distributors listed in this advertisement carry as complete a stock of Wright parts as can be found at our factory. Under these distributors a large and growing number of Approved Service Stations function. They network the whole country, and as new airports are established, new Wright Service Stations come into existence.

The list of Wright distributors is printed here to make it easy for flyers, owning Wright-powered planes, to know where spare parts can be quickly obtained.

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